Comparison of Remotely Sensed Data from Different Sensors with Different Spatial and Spectral Resolutions to Characterize Stream Buffer Zones Vegetation

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ABSTRACT

A challenging element of watershed assessment and watershed management for water quality amelioration is the procurement of up-to-date land use land cover (LU/LC) data including the vegetation composition and density. This challenge becomes even more difficult due to the complexity and abundance of various vegetation types in the buffer zones. The ability to assess and monitor land use activities and vegetation along the stream buffer zones over time with an adequate resolution and sufficient accuracy will greatly improve the effectiveness of watershed assessment, hydrologic and water quality modeling, and the implementation of land use management programs for water quality amelioration.
In this study, remotely sensed data from different sensors with different resolutions (both spectral and spatial) are compared to detect and monitor stream buffer zones vegetation composition. Landsat ETM+ (30m), digitized and orthorectified color infrared photos (1m), IKONOS multispectral (4m), and SPOT multispectral (20m) data are utilized in this investigation. Additionally, data fusion techniques are used to take advantage of higher spatial resolution panchromatic imaging capability of three satellites given above. With the fusion of panchromatic imagery to multispectral imagery, fused 15-meter Landsat, 10-meter SPOT, and 1-meter IKONOS multispectral data is added to equation to analyze the effectiveness of different data types over stream riparian buffer zones vegetation detection and monitoring. The advantages and disadvantages of these state-of-the-art sensors will be discussed as to the vegetation mapping and monitoring.